EVENT DMAP 2002-011

# MILLENNIUM CHALLENGE 2002

# DATA MANAGEMENT AND ANALYSIS PLAN

1 July 2002

**Prepared by:**

| Joint Interoperability Test Command | Joint Combat Identification Evaluation Team | and | Single Integrated Air Picture System Engineer |

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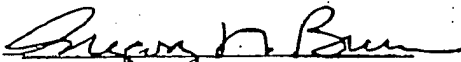(703) 578-5696

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# DATA MANAGEMENT AND ANALYSIS PLAN

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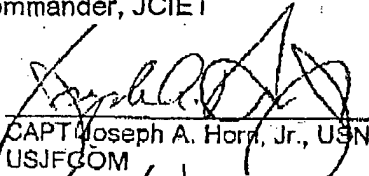Distribution is Unlimited.**

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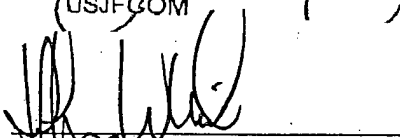
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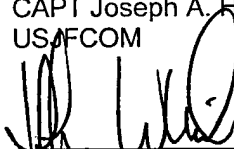# MILLENNIUM CHALLENGE 2002

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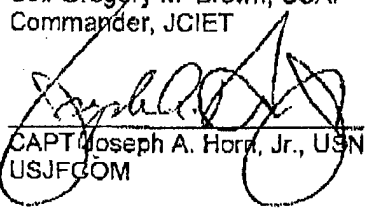# MILLENNIUM CHALLENGE 2002

## DATA MANAGEMENT AND ANALYSIS PLAN

1 July 2002

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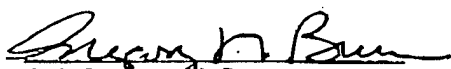USJFCOM

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## GOVERNMENT RIGHTS IN DATA STATEMENT

# EXECUTIVE SUMMARY

## ISSUES
Integrated Air Defense System (IADS) performance and Joint Data Network (JDN) assessments must be conducted to determine what programs need improvements. Exercises such as those conducted at Millennium Challenge 2002 are invaluable for determining current capabilities and projecting future requirements.

## BACKGROUND
United States Joint Forces Command (USJFCOM) and the Single Integrated Air Picture Task Force (SIAP SE TF) have requested the teaming of the Joint Combat Identification Evaluation Team (JCIET), the Joint Interoperability Test Command (JITC), and the Single Integrated Air Picture Analysis Team (SAT) to develop a process for determining the quality and means for improving the Single Integrated Air Picture (SIAP) during various field events, exercises, and experiments. MILLENNIUM CHALLENGE 2002 (MC02) will be used to formalize the relationships, procedures, and methodologies required to establish this process. After MC02, the team will collectively evaluate the processes and procedures used to incorporate changes as necessary to support future events, such as ROVING SANDS 2003.

MC02 addresses air breathing threat (ABT), cruise missile (CM), and ballistic missile (BM) tracks. The JDN includes these tracks, and also includes ground, surface, sub-surface, and space tracks. During MC02, JCIET, JITC, and SAT representatives will collaborate to perform an assessment of the JDN targeted specifically at the SIAP. In addition, empirical data will be collected to support SIAP SE TF analysis efforts such as perturbation analysis studies, and calibration of modeling/simulation and hardware-in-the-loop tools.

## APPROACH
This document is in part a companion to the SIAP Standard Data Management and Analysis Plan (DMAP) and will refer often to that document for background information. The JITC MC 02 Interoperability Support Plan is also a key reference document for background on JDN assessment processes for this event.

## SCOPE
This document provides a high-level description of the event and identifies roles and responsibilities of on-site teams. This document also includes details of planning efforts, on-site activities, post-event analysis and reporting, and lessons learned processing.

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# 1. INTRODUCTION

This document is the product of a collaborative effort between representatives of the Joint Combat Identification Evaluation Team (JCIET), the Joint Interoperability Test Command (JITC), and the Single Integrated Air Picture Analysis Team (SAT). In addition to establishing the business processes to be used, this document will serve two primary purposes. The first purpose is to describe the roles and responsibilities of evaluation organizations in support of United States Joint Forces Command (USJFCOM) and Single Integrated Air Picture System Engineering Task Force (SIAP SE TF) objectives. The second purpose is to identify and convey MILLENNIUM CHALLENGE 2002 (MC02) data-collection, analysis, and reporting requirements:

1. Document analysis objectives for each organization

2. Provide data collection and distribution process requirements to ensure accomplishment of analysis objectives

3. Identify instrumentation required for data collection effort

4. Identify points of contact who are accountable for collection, processing, reproduction, distribution, analysis, and reporting of data within each participating organization

5. Define the process and schedule for data analysis, product delivery, test observation report processing, lessons learned processing, and event reporting

## 1.1 BACKGROUND

United States Joint Forces Command (USJFCOM) and the Single Integrated Air Picture Task Force (SIAP SE TF) have requested the teaming of the Joint Combat Identification Evaluation Team (JCIET), the Joint Interoperability Test Command (JITC), and the Single Integrated Air Picture Analysis Team (SAT) to develop a process for determining the quality and means for improving the Single Integrated Air Picture (SIAP) during various field events, exercises, and experiments. The MILLENNIUM CHALLENGE 2002 (MC02) event will be used to formalize the relationships, procedures, and methodologies required to establish this process. After the MC02 event, the team will collectively evaluate the processes and procedures used to incorporate changes as necessary to support future events such as ROVING SANDS 2003.

MC02 addresses air breathing threat (ABT), cruise missile (CM), and ballistic missile (BM) tracks. The JDN includes these tracks, and also includes ground, surface, sub-surface, and space tracks. During MC02, JCIET, JITC, and SAT representatives will collaborate to perform an assessment of the JDN targeted specifically at the SIAP.

In addition, empirical data will be collected to support SIAP SE TF analysis efforts such as perturbation analysis studies, and calibration of modeling/simulation and hardware-in-the-loop tools.

## 1.2 Roles and Responsibilities

Table 1 lists the core team responsible for overall planning and execution of MC02 data collection, analysis, and reporting efforts. Pending funding and availability, the team will be augmented as required by platform operators, subject matter experts representing systems that participated in the event, and functional subject matter experts that provide expertise in a specific technical area.

Table 1. MILLENNIUM CHALLENGE 2002 Points of Contact

| Organization | Name | Telephone Number (COMM) (DSN) | E-mail (UNCLASSIFIED) (SIPRNET) |
|---|---|---|---|
| USJFCOM | LCDR Pat Bindl | (757) 836-5869 | bindl@jfcom.mil |
| USJFCOM | Mr. John Dorris | (757) 836-5881 | dorrisj@jfcom.mil |
| SIAP SE TF | Maj. Dave Chelen | (703) 602-6441 x252 | ChelenDE@NAVSEA.NAVY.MIL |
| SIAP SE TF | Mr. Darrell Schultz | (703) 602-6441 X228 | SchultzDP@NAVSEA.NAVY.MIL |
| SIAP SE TF | Mr. Joey Wang | (703) 602-6441 X215 | WangJ@NAVSEA.NAVY.MIL |
| SIAP SE TF | Christy DeHaven | (540) 663-9730 | CDeHaven@northropgrumman.com |
| SIAP SE TF | Betty Youmans | (703) 578-5696 | eyoumans@spa.com |
| JITC | Maj. George Elefteriou | (520) 538-5052 DSN 879-5052 | elefterg@fhu.disa.mil elefterg@honor.jitc.disa.smil.mil |
| JITC | Maj. Christopher Zimmerman | (520) 533-0152 | zimmermc@fhu.disa.mil |
| JITC | Mr. Thomas Cole | (520) 533-5421 DSN 821-5421 | colet@fhu.disa.mil |
| JITC | Mr. John Dugas | (520) 533-9257 DSN 821-9257 | dugasj@fhu.disa.mil |
| JITC | Aman Adeli | (520) 538-5474 | adelia@fhu.disa.mil |
| JCIET | Joe Gordon | (850) 882-6700 (ext 7020) DSN 872-6700 (ext 7020) | joe.gordon@eglin.af.mil |
| JCIET | Jeff Lutz | (850) 882-6700 x7500 | jeff.lutz@eglin.af.mil |

| NWAS | Mr. Dan Bergstrom | (909) 273-5084 | BergstromDJ@corona.navy.mil |
|------|-------------------|----------------|------------------------------|
| CNA | Mr. Paul Symborski | (703) 824-2424 | symborsp@cna.org |
| PEO AMD | Mr. Chuck Treece | (256) 864-7020 | Chuck.Treece@peo.mevatec.com |

## 1.2.1 USJFCOM

The Director, Operational Test and Evaluation (DOT&E) and USJFCOM are co-sponsors of MC 02. In addition, USJFCOM is responsible for identifying any Events of Interest (EOIs) for analysis, assisting in prioritization of post-event analysis focus areas, and providing guidance on future joint analysis collaboration efforts.

USJFCOM is also responsible for providing HLA for flying objects (ABTs, CMs, and BMs) post execution.

## 1.2.2 Single Integrated Air Picture System Engineer Task Force (SIAP SE TF)

The SIAP SE TF is a partner with USJFCOM for MC02 analysis efforts and is responsible for identifying data and analysis requirements needed to support SIAP Block 1 issues. Specifically, the SIAP SE TF is requesting assistance (time and resources permitting) from JITC, JCIET, and SAT representatives to support IADS Performance assessments, root-cause analysis, SIAP critical experiment evaluations, lessons learned reporting, and test observation report efforts.

## 1.2.3 JITC Joint Operations C4I Assessment Team (JOCAT)

JITC is responsible for collecting Link 16 data via a Radio Frequency (RF) interface using a Link Monitoring System (LMS)-16, range data from the Nellis Air Combat Training System (NACTS), Tactical Information Broadcast Service (TIBS), Tactical Receive Equipment and Related Applications (TRAP)/TRAP Data Dissemination System (TDDS) data via the Combined Air Operations Center (CAOC) in Tactical Data Intercomputer Message Format (TDIMF), and selected voice circuits.

JITC will support analysis of any EOIs identified to JITC by USJFCOM during MC02.

JOCAT will record Link 16, NACTS, TIBS/TRAP/TDDS, and selected voice circuits for eight hours each day for the period 24 July through 9 August 2002. JITC will time stamp anomalies for JCIET and JITC post-event analysis. During the period 5 to 8 August 2002, the execution assessment will target the Nellis AFB live event.

USJFCOM will provide high level architecture (HLA) for flying objects (ABTs, CMs, and BMs) post execution. JITC will integrate HLA into JOCAT at that point for post execution JITC analysis use. JITC will provide JCIET NACTS and HLA data.

Finally, representatives from JITC, JCIET, and the SAT will team to perform root-cause analysis of identified SIAP deficiencies.

### 1.2.4  Joint Combat Identification Evaluation Team (JCIET)

JCIET is responsible for collecting system central track stores and host link data for use in calculating the SIAP attributes as defined in the SIAP SE Technical Reports 2001-001 and 2001-003 and supporting root cause analysis. Section 3.3 of the SIAP Standard DMAP discusses the SIAP attributes and the IADS performance assessment process in further detail. JCIET will be the sole repository of system central track stores data in support of MC 02. JCIET will coordinate with the appropriate materiel developers and program managers to ensure live system data are collected during the time period from 24 July to 9 August. JCIET is also responsible for supporting root cause analysis of JDN-related anomalies identified by JITC.

JCIET and JITC organizations will individually conduct the analysis efforts briefly described above. After some initial data analysis, JITC will identify to JCIET any requests for root cause analysis support based on JDN level observations that require analysis of system level data. Also, JCIET will identify to JITC any observations or requests on MIL-STD conformance matters. Representatives from the SAT will provide assistance as required for these efforts.

### 1.2.5  Single Integrated Air Picture Analysis Team (SAT)

Time and funding permitting, representatives from the SAT will augment the JCIET and JITC efforts. Specifically, the SAT provides subject matter experts (pending availability) to assist with IADS Performance assessments, root-cause analysis, SIAP critical experiment evaluations, lessons learned reporting, and test observation report efforts.

## 2.  MC 02 OVERVIEW

MC 02 (MC 02) is a joint integrating event sponsored by U.S. Joint Forces Command (USJFCOM), bringing together both live field exercises and computer simulation 24 July –15 August 2002. It is a critical building block of future military transformation.

MC02 will incorporate elements of all military services, most functional/regional commands and many DoD organizations and federal agencies. The Secretary of Defense has directed that participants involve elements representative of their future force concepts such as the Air Force's Expeditionary Aerospace Force, the Army's medium-weight brigades and the Navy's "Forward From the Sea" vision.

The MC 02 assessment has two phases – execution and post execution. JITC will lead the execution phase, and JCIET will lead the post execution phase. Analysis will be performed from data gathered during MC 02. JITC will focus its analysis efforts on the information broadcast onto the JDN, JDN management and operations based on CJCSM 6120.01B, and MIL-STD 6016A compliance. JCIET will focus its analysis efforts on calculating the SIAP attributes as defined in the SIAP SE Technical Reports 2001-001 and 2001-003 using system level recordings, link data, and TSPI. JCIET and JITC will team to perform root cause analysis of identified SIAP deficiencies. Representatives from the SAT will assist in the IADS performance assessment and root-cause analysis processes discussed in Section 3.3. and 3.4 of the SIAP Standard DMAP pending time, funding, and resource availability.

## 2.1 MC 02 JDN/SIAP Goals

The primary goals for MC02 are to establish a baseline to determine the quality of the SIAP (and eventually the entire JDN) and to provide recommendations for its improvement. Assessment factors are as follows:

1. Provide a baseline for comparison of JDN performance during future USJFCOM and SIAP SE TF sponsored field events, exercises, and experiments

2. Provide a baseline for comparison to measure interoperability progress of live and simulated systems

3. Identify and analyze technical interoperability problems (root causes) and provide recommendations for improvement

4. Address the quality of the SIAP using metrics approved by the SIAP System Engineer in Technical Report 2001-001.

5. Support the life cycle of developing systems as specified in Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6212.01B.

## 2.2 MC 02 JDN/SIAP Objectives

The objectives of the MC02 event are as follows:

1. Conduct IADS Performance assessment, root-cause analysis, and applicable SIAP Critical Experiments based on processes detailed in the SIAP Standard DMAP

2. Conduct assessment of MIL-STD 6016A and CJCSM 6120.01B compliance
3. Develop a consolidated test observation report (TOR) and lessons learned reporting procedure to consolidate existing JITC and SIAP SE TF processes to achieve greater synergy of effort at future events

4. Assess the extent to which systems participating in MC02 provide data and message handling services for effective operation of a Link 16 network

5. Establish solid working relations and build a repeatable process through teaming of USJFCOM, SIAP SE TF, JITC, JCIET, and SAT representatives in preparation for future event participation.

## 2.3 MC 02 Products

The expected products for MC 02 are the following:

1. Evaluation of success and shortfalls of JITC/JCIET/SAT coordination process at MC 02

2. Report on compliance to MIL-STD 6016A and CJCSM 6120.01B (conducted by JITC)

3. Evaluation of SIAP performance based on SIAP attributes and root-cause analysis of SIAP deficiencies (led by JCIET)

4. Identification, documentation, and resolution of issues and deficiencies related to the event, in particular, limitations of Millennium Challenge as a SIAP venue

5. Refinement of standardized processes, tools, and collaborative analysis methods

6. Analysis of applicable SIAP critical experiments in support of Block 1 issues (led by SAT).

## 2.4 MC 02 Schedule

Figure 1 provides a schedule for the MC 02 event.

| ID | Task Name |
|----|-----------|
| 1 | **Millennium Challenge 2002** |
| 2 | DMAP Appendix Development |
| 3 | DMAP Appendix Draft Delivered |
| 4 | DMAP Appendix (Final) |
| 5 | Test Readiness Review |
| 6 | Spin Up Week |
| 7 | Event Data Collection |
| 8 | **Analysis** |
| 9 | Data reduction and SIAP attributes calculation |
| 10 | JITC Quick-Look Report on execution analysis |
| 11 | **Interchange Meetings** |
| 12 | Team Analysis Meeting |
| 13 | Team Analysis Meeting |
| 14 | Final Report with JCIET and JITC briefing to USJFCOM |

Timeline (2002–2003): May, Jun, Jul, Aug, Sep, Oct, Nov, Dec, Jan, Feb

Milestones: DMAP Appendix Draft Delivered 6/4; DMAP Appendix (Final) 7/1; Test Readiness Review 6/20; JITC Quick-Look Report 9/27; Final Report 1/29

Figure 1. MC 02 activity schedule

## 2.5 Event Planning

Table 2 provides an event planning worksheet for the MC 02 event.

## Table 2.  MC 02 Event Planning Worksheet

| Name of Event:<br><br>Millennium Challenge 2002 | Date(s):<br>24 July – 15 Aug 2002 | Location:<br>Ft. Irwin, CA<br>Nellis AFB, NV<br>Various other loc. | Type (HWIL, Live):<br><br>Live, Simulation |
|---|---|---|---|

Systems participating:

| QTY | System Name/Service<br><br>Participants are listed in Section 4.1.1. | Computer Program Version (if applicable) | Data collection type (Automated, manual, both) |
|---|---|---|---|
|  |  |  |  |

List critical experiments to be conducted (using SIAP Standard DMAP Chapter 3 designations).  Include any discrepancies between how experiment will be conducted and the experiment description:

### Critical experiments 2-10, with an emphasis on 7-9 and possibly 10.

Data Extraction:  Provide description of discrepancies between data extraction nodes to be used and those described in Section 4.2.1 of the SIAP Standard DMAP.

Model/Tool Description for processing and analyzing data (i.e. MSI, built-in analysis tools):
JCIET computes SIAP attributes and identifies SIAP-related events of interest.

JITC has a set of analysis tools for conducting its MIL-STD 6016A analysis.

# 3. MC 02 ASSESSMENTS

This section discusses the assessment processes of activities to be conducted at Millennium Challenge 02. Section 3.1 discusses the MIL-STD 6016A and CJCSM 6120.01B compliance assessment process. The IADS assessment process is described in detail in the SIAP Standard DMAP. Highlights of the process are provided in this document for reference in Section 3.2. Finally, Section 3.3 describes the analysis process of network communication performance to be conducted by the PEO AMD, as part of the JCIET Team.

## 3.1 MIL-STD 6016A and CJCSM 6120.01B Compliance

JITC will determine the extent to which the systems participating in MC 02 provide data and message handling services for effective operation of a Link 16 network. Systems will be evaluated on whether messages comply with MIL-STD 6016A and their system-specific message implementation specifications using both transmitted and host Link 16 data. Additionally, the assessment will include analysis of the systems participating in the JDN to comply with CJCSM 6120.01B. Simulated systems as well as live systems will be included in this analysis effort.

JITC's real-time and quick look analysis, JDN characterization, and reporting thereon are described in JITC's Interoperability Support Plan for MC 02.

### 3.1.1 MIL-STD 6016A and CJCSM 6120.01B Compliance Approach

JITC will conduct post-event analysis of participating systems' compliance with MIL-STD 6016A message protocols and approved Interface Change Proposals using the following high-level MIL-STD functional area metrics:

(a) *Assess systems' conformance to message protocols in the* **System Information Exchange and Network Management** *functional area consisting of the following message set (whenever present).*

    1 *J0.0 Initial Entry*
    2 *J0.1 Test*
    3 *J0.2 Network Time Update*
    4 *J0.3 Time Slot Assignment*
    5 *J0.4 Radio Relay Control*
    6 *J0.5 Repromulgation Relay*
    7 *J0.6 Communications Control*
    8 *J0.7 Time Slot Reallocation*
    9 *J1.0 Connectivity Interrogation*
    10 *J1.1 Connectivity Status*
    11 *J1.2 Route Establishment*
    12 *J1.3 Acknowledgement*

<u>13</u>  *J1.4 Communicant Status*
<u>14</u>  *J1.5 Net Control Initialization*
<u>15</u>  *J1.6 Needline Participation Group Assignment*

*(b)*   *Assess systems' conformance to message protocols in the* **Precise Participant Location and Identification (PPLI)** *functional area consisting of the following message set (whenever present).*

<u>1</u>     *J2.0 Indirect Interface Unit PPLI*
<u>2</u>     *J2.2 Air PPLI*

*(c)*   *Assess systems' conformance to message protocols in the* **Air Surveillance** *functional area consisting of the following message set and related actions (whenever present).*

*J3.2 Air Track*
- *Track Correlation*
- *Positional Data*
- *Velocity*
- *Strength*
- *Track Quality*
- *Reporting Responsibility*

*(d)*   *Assess systems conformance to message protocols in the* **Space Surveillance** *functional area consisting of the following message set and related actions (whenever present).*

*J3.6 Space Track*
- Ballistic Missile Track Correlation
- Ballistic Missile Positional Data
- Ballistic Missile Velocity
- Lost Track Indicator
- Time for Ballistic Missile Tracks
- Non-real Time Ballistic Missile Track Report
- Ballistic Missile Reporting Responsibility
- Ballistic Missile Information Difference Recognition and Resolution
- Ballistic Missile Surveillance Data Difference (Position and Velocity)
- Termination of Ballistic Missile Track Data
- Purging of Remote Ballistic Missile Tracks

*(e)*   *Assess systems' conformance to message protocols in the* **Electronic Surveillance** *functional area consisting of the following message set and related actions (whenever present).*

<u>1</u>      *J3.7 Electronic Warfare Product Information*
           *- Line of Bearing (LOB) Reporting*
           *- Electronic Warfare Fix Reporting*
           *- Area of Probability Reporting*
           *- EW Track Reporting*
           *- Time Data*

<u>2</u>      *J14.0 Parametric Information Message*

*(f)*   *Assess systems' conformance to message protocols in the* **Electronic Warfare (EW) Intelligence** *functional area consisting of the following message set (whenever present).*

    <u>1</u>      *J6.0 Intelligence Information*
    <u>2</u>      *J14.2 Electronic Warfare Control/Coordination*

*(g)*   *Assess systems' conformance to message protocols in the* **Mission Management** *functional area consisting of the following message set (whenever present).*

    <u>1</u>      *J13.0 Airfield Status*
    <u>2</u>      *J13.2 Air Platform and System Status*

*(h)*   *Assess systems' conformance to message protocols in the* **Weapons Coordination and Management** *functional area consisting of the following message set (whenever present).*

    <u>1</u>      *J9.0 Command*
    <u>2</u>      *J9.1 Engagement Coordination*
    <u>3</u>      *J9.2 ECM Coordination*
    <u>4</u>      *J10.2 Engagement Status*
    <u>5</u>      *J10.3 Handover*
    <u>6</u>      *J10.5 Controlling Unit Report*
    <u>7</u>      *J10.6 Pairing*

*(i)*   *Assess systems' conformance to message protocols in the* **Information Management** *functional area consisting of the following message set and related actions (whenever present).*

    <u>1</u>      *3.0 Reference Point*
    <u>2</u>      *J3.1 Emergency Points*
    <u>3</u>      *J7.0 Track Management*
           *- Drop Track*
           *- ID Difference Report*
           *- Change Data Order*
           *- Emergency Status Change*

- *Force Tell Status Change*
- *Strength Change*
- *Exercise Status Order*

<u>4</u>   *J7.1 Data Update Request*
<u>5</u>   *J7.2 Correlation*
<u>6</u>   *J7.3 Pointer*
<u>7</u>   *J7.4 Track Identifier*
<u>8</u>   *J7.5 IFF/SIF Management*
<u>9</u>   *J7.6 Filter Management*
<u>10</u>   *J7.7 Association*
<u>11</u>   *J8.0 Unit Designator*
<u>12</u>   *J8.1 Mission Correlator Change*
<u>13</u>   *J15.0 Threat Warning*

*(j)*   *Assess systems' conformance to message protocols in the* **Control** *functional area consisting of the following message set (whenever present).*

<u>1</u>   *J12.0 Mission Assignment*
<u>2</u>   *J12.1 Vector*
<u>3</u>   *J12.2 Precision Aircraft Direction*
<u>4</u>   *J12.3 Flight Path*
<u>5</u>   *J12.4 Controlling Unit Change*
<u>6</u>   *J12.5 Target/Track Correlation*
<u>7</u>   *J12.6 Target Sorting*
<u>8</u>   *J12.7 Target Bearing*
<u>9</u>   *J17.0 Weather Over Target*

## 3.2  Process For IADS Performance Assessment

### 3.2.1  Critical Experiments

It is anticipated that the participants and activities planned to occur during MC 02 will satisfy the SIAP critical experiments listed below. Following the MC 02 event the SAT will determine (time and finding permitting) which vignettes provided sufficient participation and data to support a specific critical experiment. The SIAP Standard DMAP contains a comprehensive description of each critical experiment.

- <u>Data Registration</u> - Uncompensated data registration errors have a significant adverse impact on the SIAP. Systems must implement standardized sensor registration, aligning sensors, and inertial navigation systems to a common geodetic reference.

- <u>Automatic Local-to-Remote Track Correlation/Decorrelation</u> - Not all systems implement automatic correlation/decorrelation processing, and differences in the methods employed degrade warfighting capability.

- <u>Identification Processing</u> - Mis-identification is frequently caused by erroneous IFF/SIF-to-track association. Additionally, differences in the way automated identification and data fusion systems behave adds to failure to achieve commonality.

- <u>Formation Tracking and Assessment</u> - Can systems automatically assign the identification of a track that has been declared to have a strength greater than one to the tracks within the prescribed formation "window."

- <u>Model and Simulation/Stimulation Fidelity</u> - Combination of modeling/simulation, HWIL and open-air events provide sufficient fidelity to reflect operational system performance to support assessment and engineering efforts to predict warfighting improvements of implementing ICPs.

- <u>PPLI Accuracy</u> - PPLIs are believed to be very accurate; however, due to data link latencies and the fact that some navigation systems are not integrated with the data link, inaccuracies may be present. These inaccuracies will, if present, degrade the network navigation solution and data registration performance.

- <u>Multi-Link Translation/Forwarding</u> – There is a need to reliably translate and forward information from one tactical data link to another tactical data link in ways that support the SIAP. It is uncertain at the time of the signing of this DMAP whether MC 02 will be able to support this experiment.

### 3.2.2  Operational Context

Because MC 02 is a live-fly and simulation exercise the participant forces operate in a manner similar to that of a real conflict. As such, the scenarios and flight profiles are dynamic, unscripted events. In order to relate MC 02 events to the SIAP Common Reference Scenario (CRS) the SAT will review selected vignettes (time and funding permitting) and determine the commonality to the CRS.

### 3.2.3  IADS Performance Assessment

The assessment of the IADS performance will be conducted by calculating the SIAP attributes and performing root-cause analysis. The majority of the performance assessment analysis will be conducted post-event.

### 3.2.3.1 SIAP Attributes

The SIAP attributes analysis will be conducted in accordance with SIAP SE TF Technical Reports 2001-001 and 2001-003 and described in further detail in Section 3.3. of the SIAP Standard DMAP. This analysis will take place post-event and will be led by JCIET.

### 3.2.3.2 Root-Cause Analysis

Root-cause analysis in support of the IADS performance assessment will be conducted both on-site during MC 02 and post-event and will be led by JCIET.

### 3.2.4 Post-Event Analysis Efforts

Time and funding permitting, the SAT will meet after the MC 02 event in conjunction with the JCIET analysts at the JCIET headquarters, Eglin AFB, on a periodic basis to complete the IADS performance assessment analysis (SIAP Metrics and root-cause).

## 3.3 Communication Performance Analysis

The PEO AMD, as part of the JCIET Team, will conduct an analysis of network communication performance. An overview of this analysis follows:

### 3.3.1 Data Collection Overview

PEO AMD will collect Link-16 data and coordinate the collection of other system data to support the assessment of the MC 02 Link-16 Assessment Objectives. The PEO AMD will collect Link-16 data via LMS-16 and JADE system(s) located at FTCPAC in San Diego. The JADE computer will record the Link-16 messages received by the LMS-16 as well as the truth data (podded aircraft). PEO AMD will also conduct some manual data collection by querying major participating systems to determine, if possible, why they were not available on Link-16 during the course of the day/exercise.

At the end of each day, data log files will be saved and archived according to plan from the LMS-16 and JADE systems. The JADE and LMS-16 system will be used to support AARs with selected replay of data and the near real time analysis of objectives, as time permits. Test Observation Reports (TOR) will be provided to JCIET/JITC for any anomalies observed. These TORs may be used in the Final Analysis Report (FAR). A full assessment of Link-16 Assessment Objectives will require post-mission analysis. Details of the analysis planned for each of these objectives is provided below.

### 3.3.1.1 Objective − Assess Communications Performance

This objective involves an assessment of Link-16 communications performance for both the local radio frequency (RF) network and the JRE using STJ. The objective consists of four sub-objectives:

- Assess Link-16 Connectivity. The times when J2.xx messages were received from each system to determine a measure of Link-16 connectivity.
- Assess Track Reporting Capacity. An assessment of the usage of allocated track capacity for each Joint Tactical Information Distribution System (JTIDS) Unit (JU) will be made.
- Assess Ability To Meet Link-16 Throughput Requirements. Track latency and lost track messages will be assessed to determine how well the JDN handled message loading.
- Assess Track Number Block Assignments. Track number usage was assessed for each JU capable of reporting tracks.

### 3.3.1.1.1 Sub-Objective 1 − Assess Link-16 Connectivity

J2.X PPLI messages will be assessed for each JU to determine when each system was active on Link-16. A plot of JU availability will be generated for each JU. Outages will be investigated to determine the cause.

The database from the JADE computer in the TBD will be used to generate a report on when each JU was transmitting PPLI. Availability plots will be generated from this data using an Excel spreadsheet. JICO and system logs (if available) indicating when and why systems were not participating on Link-16 will be examined. .

As a fallback, the reporting of J3.2 Air Track messages by JIADS systems during ABT raids was used as an indication of Link-16 connectivity. Because simulation issues could prevent a system from reporting tracks, this is not an exact measure of operational availability. It also does not distinguish between raids when Link-16 was stable and raids when only a few track messages made it through. It is used here only as an indication of the degree that JIADS systems were available to interoperate as a family of systems during MC 02. The primary causes preventing systems from participating on Link-16 will be made from observations, as well as contacting participating organizations to determine causes.

An investigation will also be conducted to determine, if possible, the root cause of High Error Rate of received messages.

### 3.3.1.1.2 Sub-Objective 2 − Assess Track Reporting Capacity

The allocation of timeslots for track reporting for each JU will be assessed. A plot of allocated timeslot usage versus time will be generated. Periods when timeslot capacity is reached for a given JU will be noted and, if required, changes to timeslot allocations will be recommended.

The LMS-16 All Trends plot was used to support this analysis. This plot consists of a strip chart for selected systems that shows the number of timeslots used to report tracks (including air tracks, space tracks, surface tracks, ground tracks, TBM ELPs and PGIPs) on the Surveillance Net Participation Group (NPG). Many of the systems participating in the exercise had tracks forwarded through another system. The assessment involved direct reporting systems, as well as the other systems that were being forwarded.

### 3.3.1.1.3 Sub-Objective 3 – Assess the Ability to Meet Link-16 Throughput Requirements

Track messages sent and received by participants (when available) will be compared with LMS-16 recordings to determine how many messages were lost or delayed due to SATCOM capacity constraints or other issues. Periods when SATCOM capacity is exceeded will be noted and correlated to the track loading and associated scenario.

LMS-16 recordings and JADE recordings at FTCPAC and recordings at participants (when available) will be used to compare times when selected tracks were generated at one end of the SATCOM channel and when they were received at the other. **NOTE: This sub-objective can only be assessed if SATCOM or JREs are used in the exercise.**

### 3.3.1.1.4 Sub-Objective 4 - Track Number Block Assignments

Track number usage will be assessed for each JU capable of reporting tracks. Instances where track numbers are reused frequently will be noted and, if required, changes to track block assignments will be recommended. The Access database generated by the JADE computer at FPCPAC will be used to query track numbers reported by each JU and the reuse of these track numbers will be assessed.

## 3.4 Test Observation Reports

JITC and JCIET (using PEO AMD assets) will generate Test Observation Reports (TORs) during the MC 02 event. SAT members will assist in the TOR process. These TORs document a perceived anomaly, point of interest, incident or situation that requires further analysis. They are applicable to both the compliance and the IADS performance assessment efforts. Report formats, handling, and adjudication of TORs are discussed in more detail in Section 4.3.1.1. Post MC02, the team will review the process and apply lessons learned in preparation for use of the revised TOR process during RS03.

## 3.5 Perturbation Analysis

Time and funding permitting, the SAT will conduct perturbation analysis following the MC 02 event in accordance with the SIAP Standard DMAP.

# 4. EVENT EXECUTION AND DATA REQUIREMENTS

## 4.1 Test Plan and Supporting Documents

This document will serve as the test plan for this event. The next section gives an overview of the MC 02 event and its participants.

### 4.1.1 MC 02 Scenario and Participating Systems

MC 02 examines those, and other, capabilities the U.S. military would like to have around 2007. Events involving a potential future adversary – played by fictional "Country X" – are part of the experiment's crisis scenario.

About 80 percent of the experiment will consist of table- top activities, while 20 percent involves troops and equipment. Troop activity will occur at Fort Irwin, Calif.; air operations will be conducted at Nellis Air Force Base, Nevada; and Navy and Marine activities will be held off the coast of California.

#### 4.1.1.1 Participating Agencies

The following lists the non service-specific Commands participating in MC 02:

- Joint Forces Command
- US Special Operations Command
- US Space Command
- US Transportation Command

#### 4.1.1.2 Participating Systems: Army

The following lists participants from the US Army:

- US Army Forces Command
- US Army Training and Doctrine Command
- US Army Transformation
- Army Special Operations Command
- US Army Space and Missile Defense Command
- III Corps
- 82nd Airborne Division
- 325 Airborne Infantry Regiment
- 3rd Brigade Combat Team, 2nd Infantry Division
- 1-101st Aviation Regiment, 101st Airborne Division (Air Assault)
- US Army Communications - Electronic Command
- Army Transformation Experiment 2002

### 4.1.1.3 Participating Systems: Navy

The following lists participants from the US Navy:

- Naval Weapons Station China Lake
- Fleet Combat Training Center Pacific
- Naval Air Station Paxtuxent River
- Naval Air Station Point Mugu
- Naval Station Newport
- Naval Amphibious Base Coronado/Naval Air Station North Island
- Naval Surface Warfare Center Dahlgren
- USS BOXER
- USS COMSTOCK
- USS CORONADO
- USS FITZGERALD
- USS LAKE ERIE

### 4.1.1.4 Participating Systems: USMC

The following lists participants from the US Marines Corps:

- Marine Forces Atlantic
- Marine Corps Warfighting Laboratory
- First Marine Expeditionary Force

### 4.1.1.5 Participating Systems: Air Force

The following lists participants from the US Air Force:

- Air Combat Command
- Air Mobility Command
- Air Force Space Command
- 12th Air Force
- Air Warfighting Center (AWFC), Nellis AFB
- Electronics Systems Center (ESC), Hanscom AFB
- AWACS
- AOC
- JSTARS
- Rivet Joint

## 4.2 Test Item Description and Configuration

During the spin-up portion (prior to the MC 02 event), it is imperative that each system representative ensures that the data extraction points listed in the data

collection matrices are working and providing the data expected for conducting the critical experiments (e.g., at the appropriate data rates, are recording properly). The SIAP Standard DMAP provides tables in Section 4 with the appropriate data extraction points and the format of the data to be collected.

## 4.2.1  Data Extraction Diagrams

Participants will follow the data extraction diagrams provided in the SIAP Standard DMAP.

## 4.2.2  Data Recording

JITC's JOCAT will record data or import data from other sources using the file formats defined in Table 3:

Table 3.  JITC JOCAT Data Recording

| Category | Recording Device | File Format |
|---|---|---|
| Link 16 | LMS-16 | .sdx (proprietary Northrup Grumman format) |
| Link 16 | JITC's Theater Missile Defense (TMD) Interoperability Assessment Capability (TIAC) Link 16 Parser | Comma Separated Variable (CSV) |
| TIBS | JITC's TIBS Interface Processor | TDIMF |
| TDDS | JITC's TDDS Interface Processor | TDIMF |
| NACTS | JITC's NACTS Interface Processor | CSV |
| Voice | Eyretel Voice Recorder | .wav audio files |
| HLA | HLA results (run by USJFCOM) | Microsoft Access Database files |

## 4.2.3  Data Collection Requirements

JITC will primarily use four types of data for the MIL-STD assessment: Link 16 data (collected by LMS-16), participating systems' host link data, ground truth for live systems in Nellis airspace and reported by NACTS, and ground truth for simulated objects via HLA recording. JCIET will obtain participating systems' host link data, and with necessary approval for each system obtained, will provide this data to JITC.

JCIET will calculate the SIAP attributes. The SIAP attributes assess the quality of the track information the operators had available to them. Consequently, the information available to the operators (often called Central Track Stores, or CTS) is required for this analysis. Furthermore, the form of the system data used for this analysis must be consistent with how the information is presented to the operator. This is particularly important in the case of mutual tracks, where both local and remote data are available: the data assessed for each system must be consistent with its operator display implementation. In most cases, calculation of the SIAP attributes depend on

assignment of tracks to ground truth, so ground truth data must also be available. Root cause determinations may also require link data (from all participants). For the CAOC, ADSI data will be used as the primary data for SIAP analysis, supplemented with TBMCS SAA data for certain time periods of interest.

Each system representative is responsible for collecting data that will be read into the PET tool. The variables and formats needed for PET are provided in Section 4.2.2 of the SIAP Standard DMAP. Table 4 summarizes the data needed to support SIAP attribute calculations and root cause analysis. JCIET will ensure the system data identified in Table 4 is collected and reduced. A more explicit table of extraction points and data collected will be provided in future events such as Roving Sands 03.

Table 4.    JCIET Coordinated Data Recording

| System | Extraction Point | Extracted Data |
|---|---|---|
| AWACS | AOCP | Central track file |
| | AOCP | Data link input/output |
| | JTIDS Terminal | Data link input/output |
| CAOC-ADSI | ADSI host | Data link input/output |
| CAOC -TBMCS | TBD | Central track file |
| | TBD | Data link input/output |
| | TBD | Operator Actions |
| Rivet Joint | CSC | Central track file |
| | CSC | Data link input/output |
| | CSC | Operator Actions |
| | JTIDS Terminal | Data link input/output |
| JSTARS | CSC | Central track file |
| | CSC | Data link input/output |
| | CSC | Operator Actions |
| | JTIDS Terminal | Data link input/output |
| USS BOXER (LHD 4) | TBD | Link input/output buffers Central Track Stores |
| USS CORONADO (AGF 11) | TBD | Link input/output buffers Central track stores |
| USS LAKE ERIE (CG-70) | C&D | Central track stores |
| | C2P | Data link input/output |
| | SGS | |
| | SPY | |
| | WCS Mark 8 | |
| USS FITZGERALD (DDG-62) | TBD | Link input/output buffers Central track stores |
| E-2C | CSC | Track file |
| | CSC | Data link input/output |
| | CSC | Operator actions |
| Link-16 at SOCAL | PEO AMD | IAW PEO AMD plan |
| * Recorded using Terminal recording device | | |

## 4.3 Data Exchange

JITC will provide data to JCIET from the LMS-16 recordings as .sdx files. JITC will also provide JCIET NACTS data in csv and PET tool formats. JCIET will be the sole repository for system central track files and link input/output files. After JCIET has obtained the necessary approval for each system, it will provide JITC with tactical systems' host link data (link input/output buffer files) specified in Table 4.

### 4.3.1 On-Site Analysis Activity

JITC will conduct limited on-site data analysis to support daily debriefings focusing on MIL-STD 6016A compliance and JDN performance during the experiment. JITC will assist JCIET by providing workspace for up to two JCIET analysts during conduct of the MC 02 experiment.

JCIET on-site activity will focus on collecting the data in Table 4 as well as assisting in identifying SIAP-related events of interest. These include misidentifications, mis-associations, leakers, incidents of fratricide, IFF/SIF differences, dual tracks, and other issues discussed in the SIAP Standard DMAP.

One of the goals of MC 02 is to establish a process for JITC, JCIET, and the SAT to conduct TOR recording, tracking, and adjudication. Due to limited funding and resources for MC 02, the complete TOR process (generating, exchanging, tracking and adjudicating) discussed in Section 4.3.1.1 will be conducted to a limited degree (1-5 TORs) to demonstrate and assess the TOR process. This is a prototype process that will be matured to meet JCIET, JITC, and SAT requirements for future events.

Due to funding and availability, on-site SAT participation will be limited. Specifically, representatives of the SAT will be on-site to exercise the new consolidated TOR process in conjunction with JITC and JCIET. No on-site SAT activity will take place for root-cause analysis or for daily debriefs.

### 4.3.1.1 Test Observation and Final Analysis Reports (TORs/FARs) Generation and Management

When an anomaly is observed during the test event or discovered during post-test analysis, the analyst will document the anomaly in a TOR and associated FAR. JCIET, JITC, and the SAT will generate TORs. SAT members will assist in the TOR process. All TORs written during the event will undergo a screening process. Any TOR that is incomplete or requires additional information will be sent back to the originator for further clarification. The SAT will enter those TORs that are deemed SIAP-related and analytically relevant into a tracking table for later SAT analysis.

## 4.3.1.1.1 TOR/FAR Numbering Scheme

To easily identify and track TORs, JCIET and JITC analysts will identify TORs using the characters "MC02" and a sequential three-or-four-digit number according to the following block numbering scheme:

- The TOR numbers (500-699) are reserved for the SAT to document anomalies noted during the test.

- The TOR numbers (700-899) are reserved for JCIET personnel for documentation of anomalies noted during the test based on real-time observations.

- The TOR numbers (900-1099) are reserved for JITC personnel for documentation of anomalies noted during the test based on real-time observations.

- The TOR numbers (1100-1299) have been reserved for JCIET documentation of anomalies noted during the IADS performance analysis process.

- The TOR numbers (1300-1499) have been reserved for JITC documentation of interoperability anomalies noted during the JDN analysis process.

*Example: MC02-1310 indicates a test session that was conducted for Millennium Challenge 02 and it was the tenth TOR written by JITC during the test session.*

FARs associated with a given TOR will bear that TOR's tracking number. To support multiple FARs on a given TOR, FARs will also carry an incremental version number (i.e., MC02-1310-1, MC02-1310-2, etc...).

JCIET and JITC will track the status of their TORs/FARs respectively, using an MS Word or Excel file for that purpose. These files should be regularly updated and exchanged between JCIET, JITC, and the SAT via SIPRNet email during the post-test analysis phase of MC 02.

## 4.3.1.1.2 Post-Test Exchange of TORs/FARs

If JCIET has recorded any TORs related to MIL-STD conformance issues, it will provide them to JITC for detailed analysis. JITC will analyze these MIL-STD TORs and document the analysis in FARs. JITC will then provide their TORs with accompanying FARs back to the JCIET staff. If necessary, JCIET will coordinate adjudication of these TORs/FARs with system representatives to determine root cause and problem isolation. The SAT will participate in adjudication of SIAP-related TORs. JCIET, JITC and the

system representatives will use Technical Interchange Meetings and additional FAR generation to vet any non-concurrence.

JITC will provide all of their TORs related to SIAP issues and/or requiring root cause determination to the JCIET staff. JCIET will analyze these TORs and document the analysis in FARs. JCIET will then provide these TORs with accompanying FARs back to JITC and system representatives. JCIET will coordinate with system representatives to determine root cause and problem isolation.

### 4.3.1.1.3 TOR/FAR Status, Categorization, and Criticality

JCIET and JITC analysis will track the status of all TORs/FARS according to Table 5.

Table 5.  TOR/FAR Status

| STATUS | Further Analysis Required? | STATUS DESCRIPTION |
|---|---|---|
| Open | Yes | TOR is under investigation.  Analysis ongoing. |
| | No | A hardware or software fix may have been identified but the fix has not yet been verified. |
| Closed | No | Insufficient data and analysis of the TOR is not feasible. |
| | No | After review by cognizant engineering activity, the TOR was determined to be invalid. |
| | No | TOR has been analyzed by cognizant engineering activity and was not reproducible under laboratory conditions and analysis of data tapes cannot isolate the observed anomaly. |
| | No | Hardware or software fix has been implemented and problem has been verified as resolved. |

JCIET, SAT, and JITC analysts will categorize TORs/FARs into categories according to Table 6.  Given that SIAP's critical experiments are, in large measure, a subset of MIL-STD requirements, many TORs/FARs will fall into both a SIAP and MIL-STD categories.  These TORs/FARs will be identified with both categories.

Table 6. TOR/FAR Categorizations

| FUNCTIONAL AREA | CATEGORY DESCRIPTION |
|---|---|
| SIAP - Data Registration | Uncompensated data registration errors have a significant adverse impact on the SIAP. Systems must implement standardized sensor registration, aligning sensors, and inertial navigation systems to a common geodetic reference. |
| SIAP - Automatic Local-to-Remote Track Correlation/Decorrelation | Not all systems implement automatic correlation/decorrelation processing, and differences in the methods employed degrade warfighting capability. |
| SIAP - Identification Processing | Mis-identification is frequently caused by erroneous IFF/SIF-to-track association. Additionally, differences in the way automated identification and data fusion systems behave adds to failure to achieve commonality. |
| SIAP - Formation Tracking and Assessment | Can systems automatically assign the identification of a track that has been declared to have a strength greater than one to the tracks within the prescribed formation "window", How often will this processing provide the correct identification? The incorrect capability? |
| SIAP - Model and Simulation/Stimulation Fidelity | Combination of modeling/simulation, HWIL and open-air events provide sufficient fidelity to reflect operational system performance to support assessment and engineering efforts to predict warfighting improvements of implementing ICPs. |
| SIAP - PPLI Accuracy | PPLIs are believed to be very accurate; however, due to data link latencies and the fact that some navigation systems are not integrated with the data link, inaccuracies may be present. These inaccuracies will, if present, degrade the network navigation solution and data registration performance. |
| SIAP - Multi-Link Translation/Forwarding | There is a need to reliably translate and forward information from one tactical data link to another tactical data link in ways that support the SIAP. |
| MIL-STD - Violation | Problem is a violation of the MIL-STD. |
| MIL-STD - Ambiguity | Problem is the result of poorly defined process in the MIL-STD. |
| MIL-STD - Omission | Problem is not addressed by the MIL-STD. |
| Other | If not in one of the above functional area. |

There are a number of different criticality categorization schemes in use throughout the data link testing community. The particular scheme most appropriate for use during MC 02 and future JCIET events is yet to be determined. The JCIET/JITC/SIAP TF team will collaborate during MC 02 to define the most appropriate scheme useable by all and apply that scheme to both MC 02 and future teamed events.

Table 7 contains a sample TOR and Table 8 contains a sample FAR. TORs and FARs will be exchanged between the participating organizations via SIPRNET e-mail accounts.

Table 7.    Test Observation Report (TOR)

| Millennium Challenge 2002 Test Observation Report (TOR) | | |
|---|---|---|
| **Classification:** (circle one) <br><br> UNCLAS <br><br> CONF <br><br> SECRET | **System(s) TOR is written against:** | **TOR Number:** |
| | | **Operator Position:** |
| | | **Reported by:** <br><br> **Phone #:** <br><br> **Email:** |
| **Date of event:** | **Time:** <br> Zulu Time: <br> Or <br> Local Time: | **Tape Numbers:** |
| **Description:** | | |
| **Impact:** (optional) | | |

| TOR Instructions | |
|---|---|
| Classification | Security classification of the TOR. |
| System | Aircraft, ship, or land based site (TAOC, CRC, ICC, DDG, etc.) affected by observed anomaly. |
| TOR number | TOR number (to be assigned when entered into tracking table or database) |
| Operator Position | Watch/test station where the observation was made. |
| Reported by | Originator of the TOR and command. |
| Phone Number | Phone number originator can be reached at after event. |
| Tape Numbers | Complete tape number for the DX tape to use for analysis (include system, if known). |
| Date of event | Date of observation (MMDD). |
| Time | Time of observation.  Designate either Zulu or Local Time. |
| Description | A thorough description of the observation.  Should include system name and configuration, scenario information, tracks, identifications, track kinematics, and other information necessary to establish the same environment as the observation.  Also include information as to what actually happened during the observation. |
| Impact | A brief description of the operator impacts this deficiency had on the operator or system if not corrected. |

Table 8.    Final Analysis Report (FAR)

| CLASSIFICATION | | |
|---|---|---|
| **Millennium Challenge 2002 Final Analysis Report (FAR)** | | |
| **TOR #:** | **FAR Date:** | **FAR Revision #:** |
| **Short Title:** | | |
| **Date of event:** | **Analyst Name:** | |
| **Time of event:** | **Phone:** | |
| **System(s)/IU #:** | **E-mail:** | |
| **Program Version:** | **Analysis Hours:** | |
| **Tapes/Files:** | | |
| **Status:**<br>**Open    Closed** | **Further Analysis Required?**<br>**Yes            No** | **Test Objective Required?**<br>**Yes            No** |
| **Functional Area:** | | **TTP Issue?**<br>**Yes            No** |
| **Problem Summary:** | | |
| **ANALYSIS DETAIL**<br>**Detailed Sequence of Events (Actions, times, results, etc.):** | | |
| **Analysis Conclusion:** | | |
| **Proposed Operation Workaround:** | | |
| **Operational Impact:** | | |

## FAR Instructions

**Classification:** Security classification of the FAR.

**TOR#:** Represents the TOR number assigned by the originating organization

**FAR Date:** FAR creation date.

**FAR Revision #:** Represents the number of analysis efforts against the TOR.

**Short Title:** A very brief description of the observation from the referenced TOR.

**Date of Event:** Date observation was made.

**Time of Event:** Time observation was made.

**System(s)/IU #:** Specific system(s) affected.

**Program Version:** Represents the combat system version for the unit/aircraft that originated the deficiency.

**Tapes/Files:** Data files used during the analysis process.

**Analyst Name:** Person analyzing the deficiency.

**Phone:** Analyst phone number.

**E-mail:** Analyst e-mail address.

**Analysis Hours:** Hours expended in the analysis of the deficiency.

**Status:** Open or Closed

**Further Analysis Required?:** Yes or No

**Test Objective Required? :** Yes or No

**Functional Area:** As identified by Table 6

**TTP Issue:** Yes or No

**Problem Summary:** A thorough description of the observation. This information should include what actually happened during the observation.

**Detailed Sequence of Events:** Detailed description of the events that occurred to cause the deficiency.

**Analysis Conclusions:** Conclusions from the analysis effort to determine if the deficiency is valid or if it should be closed.

**Proposed Operation Workaround:** A brief description of what could be done to work around the deficiency.

**Operational Impact:** A brief description of the operational impact this deficiency will have on the operator/system if not corrected.

JITC will prepare TORs that are a result of MIL-STD violations. JITC will then coordinate further analysis by assigning the TOR(s) to JCIET who will coordinate with appropriate system representatives for the affected system(s). JCIET will also coordinate with system representatives who will use their system-specific analysis tools and methodologies to determine the cause of the TOR(s) and generate FAR(s) that will be provided to JITC.

JITC, JCIET, and system representatives will discuss and adjudicate all TORs/FARs analysis results. Once the TORs are fully adjudicated, JITC will create a synopsis of the anomaly and analysis based on the information contained in the TORs and FARs and subsequent discussions. JITC, in close coordination with JCIET, will include a MIL-STD conformance section within its report for MC 02.

## 4.4 Data Reduction

Each organization (JCIET and JITC) will perform data reduction and analysis using current organizational methodologies. Each organization is responsible for ensuring the integrity of data reduction results that it publishes within its own report to the USJFCOM.

## 4.5 Data Management and Storage

Each organization will perform its own data archival. Classified data transfer between the two organizations will be performed via mail (including FedEx) or SIPRNET for softcopies, depending on the size of the data transfer to be accomplished. JCIET collected data will not be transferred to JITC without the consent of the system program office. Table 9 provides the contact information for data storage.

Table 9. Data Management and Storage Worksheet

| Name of Person/Organization providing information | System Identification (incl. computer program version) |
|---|---|
| Description of data collected and available, including POC and accessibility information | |
| Name of Person/Organization providing information | System Identification (incl. computer program version) |
| Description of data collected and available, including POC and accessibility information | |

## 4.6 Limitations

MC 02 is limited in its SAT support, both in manning and in funding. The SAT will not be providing on-site analysis support at MC 02, and will provide minimal support to the post-event root-cause analysis effort (time and funding permitting). The emphasis of this event is on developing the process (relationships, roles) between JITC and JCIET to support JDN assessments.

## 5. DATA ANALYSIS PROCESS

Both JCIET and JITC have existing data processing and analysis methodologies. This document does not address each organization's processing/analysis methodology, but is intended to describe the management of data that are shared between the two organizations to support joint analysis.

Both JCIET and JITC will conduct post-event analysis. JITC will analyze data to support analysis of overall JDN performance and CJCSM 6120.01B conformance for both live and simulated systems that produce data onto the JDN as detailed in JITC's MC 02 Interoperability Support Plan. JCIET will provide SIAP attributes using criteria and methodology defined in SIAP SE Technical Report 2001-001 and SIAP SE Technical Report 2001-003.

During the week of 9 through 13 September 2002 (this is a target date), representatives of USJFCOM, JCIET, JITC, and members of the SAT will meet and prioritize areas of focus for post-event analysis.

Section 5.1 discusses the post-event MIL-STD 6016A and CJCSM 6120.01B compliance post-event efforts. Section 5.2 discusses the SIAP-related analysis. Section 5.3 discusses the Joint analysis improvement aspect of the post-event analysis.

## 5.1 MIL-STD 6016A and CJCSM 6120.01B Compliance

JITC will follow the process described in Section 3.1 to address the MIL-STD 6016A and CJCSM 6120.01B compliance.

JITC shall perform analysis of system performance related to MIL-STD issues. JITC will review TORs generated during on-site analysis (during event execution) and as a result of post-event analysis by both JCIET and JITC staffs.

JITC shall perform post-event analysis of critical simulation systems identified by USJFCOM to support seamless operations in the JDN (i.e., the extent to which the simulation system behaves like its real-world counterpart by examining the data contributed to the JDN by the simulation system). A primary goal of this analysis effort is to assist USJFCOM in determining the extent to which simulation systems must:

    a. Comply with MIL-STD 6016A.
    b. Replicate the behavior of their real-world counterparts.

## 5.2 IADS Performance Assessment

### 5.2.1 Data Availability Matrix

In conjunction with JITC and JCIET, SAT members (time and funding permitting) will be responsible for reviewing the data recorded and identify the time sets to be analyzed.

## 5.2.2 Critical Experiments

In conjunction with JITC, SAT members (time and funding permitting) will review the data availability matrix that is developed and identify events where sufficient data to support the critical experiments exists. The tables the SIAP Standard DMAP (Section 5.2.1) provide a cross-reference of the critical experiments to the system level data collection capability/points.

## 5.2.3 SIAP Metrics

Operational shortfalls (leakers, fratricides, reduced mission effectiveness) are often caused, at least in part, by deficiencies in the SIAP presented to the operator. For MC-02, JCIET will lead an assessment of the quality of the SIAP in terms of SIAP attributes, defined in the SIAP SE Technical Reports 2001-001 and 2001-003. These mathematically defined SIAP attributes were developed to support calculation of the key performance parameters in the TAMD and Combat Identification (CID) CRDs. A JCIET-led team of individuals from JCIET, CNA, NWAS, and PEO AMD will perform this analysis.

## 5.2.4 Root-Cause Analysis

After calculation of the attributes, JCIET will lead an effort to determine the root causes of SIAP deficiencies. For example, for instances when the picture is not common at all systems; the underlying reasons for these commonality deficiencies will be determined. To do this, tracks available to the operator for surveillance systems in the JDN will be matched to Time space Position Indicator (TSPI). The results of this match will assign tracks held by systems to one or more TSPI aircraft. Comparisons between systems and between a system and TSPI can then be made in accordance with SIAP SE defined attributes.

JITC and the SAT will provide contact information for individuals who can contribute to the root-cause analysis effort as shown in Table 10.

Table 10. Root-Cause Analysis Participant Points-of-Contact Worksheet

| Name of Person/Organization providing analysis | System Identification (incl. computer program version) |
|---|---|
| System issues analysis (including TTPs) | |
| Name of Person/Organization providing analysis | System Identification (incl. computer program version) |
| System issues analysis (including TTPs) | |

### 5.2.4.1 Events of Interest

Events of Interest (EOIs) will be identified on-site at the event as well as during the root-cause phase of the analysis after the event.

### 5.2.4.2 Test Observation Reports

TORs related to IADS performance assessment will be reviewed and adjudicated during and after the event as discussed in Section 4.3.1.1. JITC and SAT representatives will coordinate to develop a schedule for adjudicating TORs and identifying SIAP-related lessons learned to the SIAP SE TF for inclusion in the SIAP lessons learned database.

## 5.3 Joint Analysis Improvement

The joint analysis effort to be conducted by JCIET and JITC is hampered by the short planning cycle prior to the conduct of MC 02. Throughout the data collection and analysis effort, both organizations will document any factors that limited joint analysis by both participating organizations as well as those factors that impeded analysis efforts by the individual organization. JITC will coordinate their findings with applicable members of the SAT prior to publishing their report. The goal of this effort is to document improvements in the process that can be implemented prior to commencing activities for the next effort after MC 02 (ROVING SANDS 2003 is a candidate).

### 5.3.1 Development/Analysis Phases

Throughout the data collection and analysis effort, both organizations will document any factors that limited joint analysis by both participating organizations as well as those factors that impeded analysis efforts by the individual organization. These factors include any organizational, technical, or procedural inhibitors to the joint analysis process, and any workarounds developed.

### 5.3.2 Final Reporting Phase

The purpose of this phase is to report any organizational, technical, or procedural inhibitors to the reporting process and to identify any workarounds developed.

## 6. REPORTING

## 6.1 Quick-Look Report

JITC will provide a quick-look report on the execution analysis by 27 September 02 (target date). It will include a characterization of the Joint Data Network (JDN).

## 6.2 Technical Reports

JITC will generate and provide Technical Reports (TRs) for the MC 02 event. Throughout the data collection and analysis effort, both organizations will document any factors that limited joint analysis by both participating organizations as well as those factors that impeded analysis efforts by the individual organization. Both JCIET and JITC will coordinate their findings prior to publishing any individual reports. The goal of this effort is to document improvements in the process that can be implemented prior to commencing activities for the next effort after MC 02 (ROVING SANDS 2003 is a candidate). The final report will document an assessment of the limited TOR process conducted during MC 02, including any limitations or changes to the TOR process proposed in Section 4.3.1.1.

## 6.3 Lessons Learned

JCIET and JITC will work with the SAT to generate lessons learned from the MC 02 event. These lessons will include issues with logistics, planning, execution, and analysis, with a focus on the teaming process developed between JCIET and JITC. Lessons learned will also capture limitations of MC 02 as an appropriate SIAP venue. JCIET and JITC will work with the SAT to identify and document what critical experiments and post-event analysis activities can and cannot be conducted at MC 02.

## 6.4 Unresolved Issues

Any unresolved issues will be documented and included in the appropriate reports.

## 7. REFERENCES

*Theater Air and Missile Defense Capstone Requirements Document (TAMD CRD).* (2001, March). U.S. Joint Forces Command.

*Combat Identification Capstone Requirements Document (CID CRD).* (2001) U.S. Joint Forces Command.

*SIAP SE TF Technical Report 2001-001: Single Integrated Air Picture (SIAP) Attributes.* (2001, June). Arlington, VA: SIAP SE TF.

*SIAP SE TF Technical Report 2001-003: Single Integrated Air Picture (SIAP) Metrics Implementation.* (2001, October). Arlington, VA: SIAP SE TF.

*SIAP Standard Data Management and Analysis Plan, Version 1.1.* (2002, July). Arlington, VA: SIAP SE TF.

*JITC Interoperability Support Plan for Millennium Challenge 2002*, Final
Draft (11 June 2002).

# APPENDIX A

## ACRONYMS

| | |
|---|---|
| ABT | Air Breathing Threat |
| ADSI | Air Defense System Integrator |
| af | Air Force |
| AFB | Air Force Base |
| AWACS | Airborne Warning and Control System |
| BLUFOR | Blue Forces |
| CAOC | Combined Air Operations Center |
| CID | Combat identification |
| CJCSM | Chairman of the Joint Chiefs of Staff Manual |
| CM | Cruise Missile |
| CTS | Central Track Stores |
| disa | Defense Information Systems Agency |
| DMAP | Data Management and Analysis Plan |
| DOT&E | Director, Operational Test and Evaluation |
| DSN | Defense Switched Network |
| ECM | Electronic Countermeasures |
| EOI | Event of Interest |
| EW | Electronic Warfare |
| FAR | Final Analysis Report |
| GMT | Greenwich Mean Time |
| HLA | High Level Architecture |
| IADS | Integrated Air Defense System |
| ID | Identification |
| IFF/SI | Identification Friend or Foe |
| JCIET | Joint Combat Identification Evaluation Team |
| JDN | Joint Data Network |
| JICO | Joint Interface Control Officer |
| JITC | Joint Interoperability Test Command |
| JMTOP | Joint Multi-Tactical Digital Information Link Operation Procedures (CJCSM 6120.01B) |

| | |
|---|---|
| JOCAT | Joint Operational C4I Assessment Team |
| LMS-16 | Link Monitoring System-16 |
| LOB | Line of Bearing |
| MC 02 | MILLENNIUM CHALLENGE 2002 |
| MIL-STD | Military Standard |
| mil | Military |
| NACTS | Nellis Air Combat Training System |
| OPFOR | Opposing Forces |
| POC | Point of Contact |
| PPLI | Precise Participant Location and Identification |
| RF | Radio Frequency |
| SE | System Engineer |
| SIAP | Single Integrated Air Picture |
| SIPRNET | SECRET Internet Protocol Router Network |
| TBM | Theater Ballistic Missile |
| TDDS | TRAP Data Dissemination System |
| TDIMF | Tactical Data Intercomputer Message Format |
| TIAC | TMD Interoperability Assessment Capability |
| TIBS | Tactical information Broadcast Service |
| TMD | Theater Missile Defense |
| TOR | Test Observation Report |
| TRAP | Tactical Receive Equipment and Related Applications |
| USJFCOM | United States Joint Forces Command |

# .CzifraCB

**Microsoft Outlook – Memo Style**
**08–27–02  02:50**

| From: | Wilson Jeff W CAPT NSSC |
|---|---|
| Sent: | Tuesday, August 27, 2002 3:37 PM |
| To: | Czifra Cynthia B CONT NSSC |
| Cc: | 'steven.pick@js.pentagon.mil'; Morse Jeffery E LCDR NSSC; Biernesser Stephen A MAJ NSSC |
| Subject: | New slides |

127-B-30.1

Way ahead

* Use Integrated Architecture to build reference implementation and verification/validation capability
- FFRDC (a la HLA RTI model)
- Industry (may cause future competition problems)

* Reference implementation
- Leverages significant work already underway in existing disconnected and asynchronous acquisition programs
- Describes functionality that must be provided by industry in final system configurations
- Used by industry as baseline for capability and performance (industry has option of using reference implementations as-is, if performance is adequate to meet operational requirement)
- Modular, component-based approach allows for competition at component level
- Built on industry-standard, open application programming interfaces (APIs)
- Built using JDEP (scaleable distributed development environment, with access to existing systems)
- Maintained as part of Integrated Architecture
- Uses approach employed by NIST for crytographic algorithms and Internet community for internetworking protocols

* Verification/validation capability
- Built in partnership with DOT&E to help meet OT&E needs
- Built in Partnership with DISA to help meet interoperability certification needs
- Maintained in lock-step with reference implementation as part of Integrated Architecture